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Cities and Growth: Human Capital Location Choice: Accounting for Amenities and Thick Labour Markets

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Statistics Canada
Economic Analysis Division

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Symbols

The following standard symbols are used in Statistics Canada publications:

.	not available for any reference period
..	not available for a specific reference period
...	not applicable
0	true zero or a value rounded to zero
0^s	value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
^{p}	preliminary
^{r}	revised
x	suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E}	use with caution
F	too unreliable to be published
*	significantly different from reference category ($p < 0.05$)

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Abstract

A growing literature has found a positive association between human capital and long-run employment growth across cities. These studies have increased interest in understanding the location choices of university degree-holders, a group often used as a proxy measure of human capital. Based on data from the 2001 Canadian Census of Population, this paper investigates determinants of the location choices of degree- and non-degree-holders. With a multinomial logit model, it tests a series of hypotheses about the differential effects of thick labor markets and amenities on the location choice of these groups across metropolitan and non-metropolitan areas in Canada.

Keywords: agglomeration economies, amenities, human capital, labor market, migration, multinomial logit model, urban growth

JEL: R11, R23

More studies related to Economic geography are available in Update on Economic analysis.

Executive summary

Since the late 1970s, a growing body of research has argued that workers, especially those with high levels of human capital, may choose a place to live based on where the amenities are most attractive rather than on where it is best to earn a living. Such studies contend that workers' choice of locale is based on factors such as the natural environment, cultural and recreational opportunities, and quality of social life.

Choosing areas for their amenities has implications for firms, because their growth is often tied to finding specialized human capital. As a consequence, firms might follow workers, rather than workers following firms. This may also have implications for cities and regions whose growth has been related, theoretically and empirically, to their human capital.

The contention that amenities encourage migration and urban growth is not unchallenged. A number of recent studies demonstrate that jobs, not amenities, drive workers' location decisions. Even so, these studies find that amenities do play a role, albeit a much smaller role than jobs, and one that varies between countries and by age of worker. Amenities seem to have a stronger appeal in the United States than in Canada and for workers at the start and the end of their working lives.

The research in this paper is motivated by the following question: What leads to the concentration of human capital in some places, but not in others? The objective is to examine factors associated with migrants' location choices, especially migrants who have invested heavily in their human capital—university degree-holders. The study investigates whether amenities as opposed to potential wage gains stemming from better labour market conditions exert a stronger effect on the location choice of degree-holders compared to non-degree-holders.

A number of features of this study set it apart from past research. First, and most important, the analysis uses a decision-making framework in which employed migrants choose a location from among a set of alternatives. In past studies, which have typically used more aggregate frameworks, individual decisions are not examined. Instead, they are captured collectively by variables such as population change, total in-migration, population shares, and net migration rate. Among the studies that do focus on individuals explicitly, locations are not examined.

Second, the decision-making framework is grounded by a utility-based theory that seeks to explain why employed migrants choose one location over another—namely, demand and supply shocks and a structural mismatch between the location of skills and job tasks. To our knowledge, no other study of a similar vein has done this.

Third, this study focuses on Canada, whereas most research on the amenities versus jobs debate is based on U.S. data. This paper, therefore, offers insight into the extent to which the findings from American studies are transferable to other jurisdictions.

Finally, as mentioned above, a key objective is to better understand the migration patterns of workers with and without university degrees. Hence, this study complements a small but

growing body of research on the relationship between human capital acquisition and location choice.

Migrants tend to choose destinations that are closer, have higher average incomes, and whose populations more closely match their own characteristics (for example, language). To this can be added the extent to which the destination is specialized in the migrants' industry and occupation. This suggests that migrants are also seeking locations with better opportunities to find a close match between their skills and employers' needs.

When the level of employment in the migrant's occupation and industry across destinations is taken into account, larger cities are less attractive than smaller locales. That is, all else being equal, migrants will choose a smaller area over a large city. Large cities are more attractive because they offer a wider range of employment opportunities, not because they provide more amenities. This is consistent with disincentives stemming from city size (for example, traffic congestion).

Climate does play a role, albeit an ambiguous one. No clear preference for a climate archetype emerges. Moderate, but wet coastal climates are not necessarily preferred over continental climates. It is only apparent that within these broad categories, destinations that are the most extreme are less preferred, especially for coastal and dry continental climates.

Other amenities are associated with migrants' location choice. Places with a greater share of employment in local government, in organizations that promote social cohesion and in restaurants are more likely destinations. There is less evidence that a stronger presence of cultural industries is associated with location choice, except among degree-holders aged 30 or older. As well, the presence of visible minorities, a proxy for openness to differing lifestyles, has no apparent influence on the decisions of migrants, degree- or non-degree-holders.

This analysis is based on the premise that with a greater investment in skills come higher incomes, and consequently, a greater demand for amenities. But more skills intensify the challenge of matching them with employers' needs. Hence, while higher incomes increase the relative importance of amenities, specialized skills raise the importance of finding thick labor markets. Degree-holders are more likely to move to locations that are specialized in their industry, and they are willing to move longer distances. This is consistent with specialized workers seeking out thicker labor markets.

However, no systematic pattern in the results suggests that degree-holders value amenities any more or less than do non-degree-holders. The visible minority share of the population had no significant association with degree-holders' location choices. The association with the culture employment share was positive, but it was limited to degree-holders aged 30 or older, a group less likely to move than are younger degree-holders. Other measures of amenities also had a statistically significant association with the location choices of migrants, but they were not consistently stronger for degree-holders. Moreover, the association between amenities and degree-holders' location choice was weaker than the association with variables related to potential income gains stemming from better matching of skills and job tasks.

1 Introduction

Since the late 1970s, a growing body of published research has emerged arguing that workers, especially those with high levels of human capital, may be choosing where they live based on local amenities rather than on earning opportunities (Graves, 1979; Graves and Linneman, 1979; Graves, 1980; Porell, 1982; Knapp and Graves, 1989; Mueser and Graves, 1995; Glaeser et al., 2001; Clark et al., 2002; Florida, 2002a, 2002b, 2004; Rappaport, 2007). Such studies contend that workers base their decision on factors like the natural environment, cultural and recreational facilities, and quality of social life (Scott, 2010, p. 43). For example, American studies have demonstrated the importance of climate as a driver of migration, and consequently, urban growth (Graves, 1979; Clark and Cosgrove, 1991; Rappaport, 2007). Choosing areas for their amenities has implications for firms, whose growth, as David Packard's Law suggests[1], often depends on finding specialized human capital. Consequently, firms may be following workers, rather than workers following firms. This may also have implications for cities and regions whose growth has been tied, theoretically (Lucas, 1988) and empirically (Glaeser et al., 1995), to their human capital.

The contention that amenities are the driving force behind migration and urban growth is not unchallenged. A number of recent studies that attempted to measure the extent to which amenities influence the location decisions of workers (Greenwood and Hunt, 1989; Clark and Cosgrove, 1991; Clark and Hunter, 1992; Partridge and Rickman, 2003; Ferguson et al., 2007; Partridge et al., 2007; Hansen and Niedomysl, 2009; Storper and Scott, 2009; Scott, 2010) demonstrated that jobs, not amenities, govern these decisions, thereby corroborating much earlier work by Ravenstein (1885) and Muth (1971). At the same time, however, these studies do establish the role played by amenities—a role that is much less than that of jobs. However, this role seems to vary somewhat between countries and by age of worker. For instance, amenities appear to have a stronger effect in the United States (Partridge and Rickman, 2003) than in Canada (Ferguson et al., 2007; Partridge et al., 2007). As well, amenities are more important in the location decisions of young people (Ferguson et al., 2007) and workers nearing retirement (Ferguson et al., 2007; Scott, 2010).

This paper is motivated by the following question: "What leads to the concentration of human capital in some places, but not others?" Although higher investment in human capital in some places may be part of the explanation, net migration is important (Sjaastad, 1962; Brown et al., 2010). This report examines factors associated with the location choices of migrants, especially migrants who have invested heavily in their human capital—university degree-holders. The paper investigates whether amenities have a stronger influence on the location decisions of degree-holders compared with non-degree-holders. Thus, not only is this study informed by the current jobs versus amenities debate, but it also contributes to it.

This is not the first time factors underlying the location choices of migrants with high levels of human capital have been examined. Scott (2010) concluded from his study of 13 categories of migrant engineers in the United States that job considerations were dominant in the location

1. David Packard's Law—"No company can grow revenues consistently faster than its ability to get enough of the right people to implement that growth." (Collins, 2001, pp. 54).

choices of those of working age, and even among those who were retired or nearing retirement; the role of amenities was modest. In a study of university graduates in the United Kingdom, Faggian et al. (2007) found that when variables measuring local economic conditions and human capital acquisition were taken into account, women were more likely than men to migrate.

A number of features of this study set it apart from past research. First, and most important, the analysis uses a decision-making framework in which employed migrants choose a location from a set of alternatives. Past studies of factors behind workers' location decisions have typically used more aggregate frameworks. Such studies do not examine individual decisions; rather, they are captured collectively by variables such as population change (Ferguson et al., 2007), total in-migrants (Scott, 2010), population shares (Chen and Rosenthal, 2008), and the net migration rate (Greenwood and Hunt, 1989). And in the studies that do focus explicitly on individuals, locations are not examined (Clark and Cosgrove, 1991; Faggian et al., 2007). Second, the decision-making framework is grounded by a utility-based theory that seeks to explain why employed migrants choose one location over another—namely, demand/supply shocks and a structural mismatch between the location of worker skills and job tasks. To our knowledge, no other study has done this. Third, this analysis pertains to Canada, which is a major advantage because most research on the amenities versus jobs debate concerns the United States (Greenwood and Hunt, 1989; Clark and Cosgrove, 1991; Chen and Rosenthal, 2008; Scott, 2010). Therefore, this report offers insight into the extent to which the findings of American case studies are transferable to other jurisdictions. Finally, a key objective is to better understand the migration patterns of workers who have earned university degrees and those that have not. Hence, this analysis complements a small but growing body of research (Faggian et al., 2007; Scott, 2010) on the relationship between human capital acquisition and location choice.

The next section (Section 2) develops the location choice model, which is based on random utility theory. Section 3 reviews the data development and the model specification. Section 4 outlines the results of the model estimates. Section 5 tests the economic effect of the location choice determinants. Section 6 provides a brief summary and conclusion.

2 Model development

Theoretically, degree-holders should over time place greater value on amenities than do workers with less education. As workers invest in their human capital, their incomes are expected to rise. The concomitant declining marginal utility of income should increase the relative importance of local amenities (Graves and Linneman, 1979; Knapp and Graves, 1989; Rappaport, 2007). Evidence also suggests that amenities affect employment growth (Partridge and Rickman, 2003) and are associated with the presence and increase of workers with high human capital (degree-holders, the creative class, scientists, engineers) (Glaeser et al., 2001; Florida, 2002a, 2002b, 2004; Shapiro, 2005; Rappaport, 2007; Beckstead et al., 2008).

By investing in their education, individuals increase their earning power and develop specialized skills. But as skills become more highly specialized, matching them with firms' requirements is more difficult (Schwartz, 1976; Kim, 1989; Helsley and Strange, 1990). Consequently, highly skilled workers may have a greater incentive to seek out "thick" labor markets—locations that have large labor markets that specialize in their industry and occupation. In such places, better matching may result in higher productivity and higher incomes. As well, the job search may be more efficient, potentially shortening periods of unemployment. Finally, geographic concentration of workers may facilitate further accumulation of human capital as workers learn from each other (Glaeser and Maré, 2001).

There is a potential tension between these two views if locations that provide the best amenities are not coincident with those with suitable labor markets, and thick labor markets and amenities are independent of one another. They are, of course, not independent. A concentration of highly skilled workers will likely lead to the development of amenities (Shapiro, 2005) as much as amenities drive the concentration of these same workers. Furthermore, lower relative wages in amenity-rich areas may motivate firms to seek out these locales, thereby increasing employment (Knapp and Graves, 1989). However, when an individual migrant scans the landscape, the migrant will tend to view it as fixed. From their perspective, the skills that provide the income, which would, in turn, enable freedom of choice, may also be the skills that bind in terms of the set of choices. High levels of human capital may restrict location choice. Consequently, to understand the location choice of migrants with high human capital, it is necessary to take into account the effects of both amenities and thick labor markets.

This paper examines factors associated with employed migrants' location choices. Specifically, the analysis explores how characteristics of locations influence workers' location choices, and how these characteristics vary among workers. The appropriate model is a multinomial logit (MNL) model (Scott et al., 2005).[2] The discussion begins by developing the MNL model from the

2. Some researchers suggest that the MNL model contains information only about decision-makers, that the conditional logit model contains information only about alternatives, and that a hybrid conditional logit model contains information on both decision-makers and alternatives (Faggian et al., 2007). This work follows the view of Ben-Akiva and Lerman (1985) that the MNL model contains information on both decision-makers and alternatives. In other words, the distinction between the various models is merely a terminological difference across academic disciplines. In fact, the conditional logit model can be viewed as a special case of the MNL model.

standard random utility framework, after which it turns to the underlying economic and other forces that draw migrants to particular locations.

A worker chooses location j if its utility is higher than all other alternatives in the choice set J ($j \in J$). Following Green (1997), for worker h faced with J choices, the utility of choice j is

$$u_{hj} = \boldsymbol{\beta}' \mathbf{z}_{hj} + \varepsilon_{hj}, \tag{1}$$

where $\mathbf{z}_{hj}$ is a vector of observable characteristics of worker h and choice j, and ε_{hj} is an unobserved random disturbance. If choice j is made, it is assumed that j's utility is greater than all alternative choices k; that is,

$$\text{Prob}\left(u_{hj} > u_{hk}\right) \text{ for all other } k \neq j. \tag{2}$$

Letting Y be a random variable indicating the choice made and that the J disturbances are independently and identically distributed with a Weibull distribution, then

$$\text{Prob}\left(Y_k = j\right) = \frac{e^{\boldsymbol{\beta}' \mathbf{z}_{hj}}}{\sum_{j=1}^{J} e^{\boldsymbol{\beta}' \mathbf{z}_{hj}}}. \tag{3}$$

Utility depends on $\mathbf{z}_{hj}$, which is composed of attributes of both workers and choices. That is, $\mathbf{z}_{hj} = \left[\mathbf{x}_j, \mathbf{p}_h\right]$, where $\mathbf{x}_j$ is a vector of the attributes of choices, and $\boldsymbol{p}_h$ is a vector of characteristics of workers. By introducing this into (3), then

$$\text{Prob}\left(Y_k = j\right) = \frac{e^{\boldsymbol{\delta}' \mathbf{x}_j + \boldsymbol{\sigma}' \mathbf{p}_h}}{\sum_{j=1}^{J} e^{\boldsymbol{\delta}' \mathbf{x}_j + \boldsymbol{\sigma}' \mathbf{p}_h}} = \frac{e^{\boldsymbol{\delta}' \mathbf{x}_j}}{\sum_{j=1}^{J} e^{\boldsymbol{\delta}' \mathbf{x}_j}}. \tag{4}$$

Because $\boldsymbol{p}_h$ does not vary across choices, it is dropped from the expression.

The utility of a given location depends on the income that migrants would expect to earn and on the non-pecuniary, place-based characteristics of the location. How income and place-based measures of utility enter into (4) should reflect the declining marginal utility of income,[3] and by implication, the rising relative contribution of place-based sources of utility as income increases.

These requirements can be satisfied by a simple multiplicative, linear-homogeneous utility function. It is posited that the utility of worker h in location j is a function of income (w_{hj}) and other (non-pecuniary) sources of utility related to location j (q_j):

$$u_{hj} = w_{hj}^{\alpha} q_j^{1-\alpha}; \; 0 < \alpha < 1. \tag{5}$$

As specified, this implies the marginal utility of income declines with income,

$$\frac{\partial u_{hj}}{\partial w_{hj}} > 0 \text{ and } \frac{\partial^2 u_{hj}}{\partial w_{hj}^2} < 0, \tag{6}$$

so the relative importance of non-pecuniary sources of utility increases with income,

3. See Layard et al. (2008) for recent empirical estimates of the marginal utility of income.

$$\frac{\partial u_{hj}}{\partial q_j} \Big/ \frac{\partial u_{hj}}{\partial w_{hj}} = \left(\frac{1}{\alpha} - 1\right)\frac{w_{hj}}{q_j} > 0. \tag{7}$$

Taking the natural logarithm of (5) and substituting for x_j in (4) results in[4]

$$\text{Prob}(Y_i = j) = \frac{e^{\alpha \ln w_{hj} + (1-\alpha)\ln q_j}}{\sum_{j=1}^{J} e^{\alpha \ln w_{hj} + (1-\alpha)\ln q_j}} = \frac{w_{hj}^{\alpha} q_j^{1-\alpha}}{\sum_{j=1}^{J} w_{hj}^{\alpha} q_j^{1-\alpha}} \tag{8}$$

While equation (8) serves as the starting point for the empirical implementation of the model, it does not provide a basis for understanding the forces that drive variation in expected incomes and non-pecuniary sources of utility across locations, which would, in turn, result in migrants choosing one location over another, nor the potential relationship between income and utility.

From the standpoint of a spatial equilibrium, incomes and non-traded goods prices (for example, the price of land) should equate profits and utility across space (Roback, 1982). As such, spatial variation in factor prices should not reflect differences in utility and profits that can be arbitraged through migration and/or capital flows (Greenwood et al., 1991). Accordingly, in a spatial equilibrium, income levels (or measures of amenities) provide little information about why migrants choose one place over another. In equilibrium, migration is largely idiosyncratic, and any attempt to estimate (8) would fail.

So the question is: "What forces drive the spatial-economic system out of equilibrium such that migrants have incentives to systematically choose one location over another?" Broadly speaking, there are two factors: (1) demand and supply shocks, and (2) a structural mismatch between the location of worker skills and job tasks.

Demand and supply shocks for labor push the spatial-economic system from one equilibrium path to another. A labor demand shock may result from a shift in an industry's demand curve or its supply curve. In the short run, a rightward shift in either induces higher incomes in a potential location, assuming the supply of labour is not perfectly elastic.

A labor supply shock would likely arise from a positive or negative amenity shock. For instance, a positive amenity shock might come from the development of a new recreational area, while a negative amenity shock might arise from increased crime or pollution. A positive amenity shock would shift the labor supply curve outward, lowering incomes, while a negative amenity shock would have the opposite effect.[5]

Whether incomes and amenities, alone or in concert, should be included in the empirical model turns on how rapidly (1) incomes and (2) labor and capital flows react to demand and supply shocks. If incomes react rapidly, then, for instance, a positive amenity shock (for example, increased culture employment) would be immediately captured in lower relative incomes. Inclusion of income levels in the model would be sufficient to capture variation in amenity levels across places. On the other hand, if it takes some time for incomes to fall in reaction to an increase in amenities, the inclusion of direct measures of amenities is reasonable. If capital and labor flows build up quickly and are large enough to rapidly close income gaps that might result from a demand or supply shock, relative wage levels will be uncorrelated with any demand or supply shock. Wages will soon equate across regions, leaving little variation in relative wage levels that would capture the net flow of workers to the location that experienced the productivity shock.

4. Hence, the equivalent of a Cobb-Douglas utility function is estimated.
5. Roback (1982) develops a more extensive analysis of the relationship between amenities and wages by fully incorporating firms into the model. For illustrative purposes, a more simplified framework is employed.

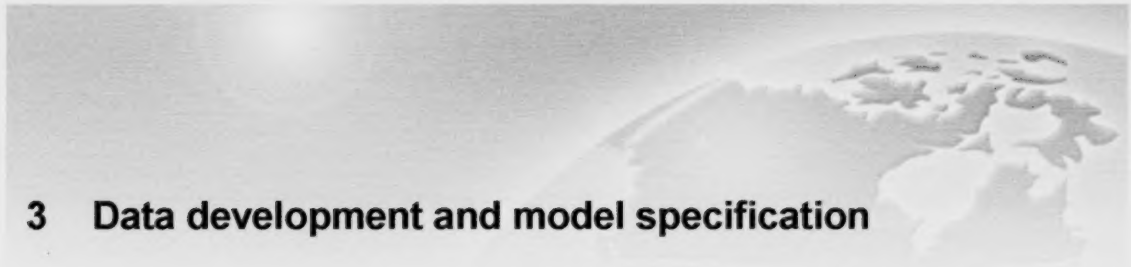
The empirical evidence points to relatively rapid shifts in wage and land prices in reaction to productivity and amenity shocks, but a very slow reaction in terms of labor and capital flows (Rappaport, 2007). Rappaport finds that local productivity or amenity shocks are quickly captured by changes in the prices of labor and housing, but friction in the movement of labor and capital leads to persistent net inflows of population. The implication is that the variation in incomes and the price of housing should be enough to capture variation in utility across locales. Of course, if incomes do not react immediately, direct measures of the demand or supply shocks should be included. The model includes proxies for expected incomes (for example, income levels in the locations). However, measures of amenities are also included, as they still may not be fully captured in relative income levels (Greenwood et al., 1991).

Of course, by including incomes in the model, the effects of both demand and supply shocks, whose impacts on incomes run in opposite directions, are being captured. A positive demand shock is expected to raise incomes, while a positive amenity shock will lower incomes. The effect of incomes on migration flows will reflect the balance of these two forces. If a variation in incomes is primarily driven by amenity shocks, their expected effect on migration flows will be negative. But if relative income levels are driven primarily by demand shocks, the impact of incomes on migration flows will be positive.

The second force driving migration flows is the structural mismatch between the location of job tasks and skills. If the demand for certain tasks (for example, financial transactions) tends to be concentrated in particular metropolitan areas, and the availability of skills to undertake these tasks does not perfectly match the distribution of demand, "structural" sorting,[6] in addition to "demand and supply shock" sorting, will take place. If jobs that require university degrees are concentrated in particular cities, degree-holders entering the labor market in other cities and rural areas will tend to sort into those cities. Without a constant inflow of new entrants, the loss of workers as they leave the labor force would quickly lead to significant declines in employment. Therefore, expected incomes and amenities will still affect migrants' location choices, even in the absence of demand and supply shocks. In this sense, structural sorting also helps identify the effect of these factors on the location choices of migrants.

Regardless of whether migration is driven by structural or demand and supply shock sorting, migrants will tend to choose locations where expected incomes are higher and non-pecuniary sources of utility are better. In this analysis, measures of industry and occupational specialization across locations are used to capture the potential for better matching between worker skills and job tasks. While these measures may detect structural sorting, part of the variation in the spatial concentration of industry and occupations may be due to demand and supply shocks.

6. Structural sorting can be conceptualized by assuming a random distribution of innate abilities across the population, but a concentration of demand for these skills because of agglomeration economies and other forces that drive the spatial concentration of job tasks. Without a constant flow of workers between spatial units, the spatial concentration of job tasks could not be maintained as workers leave the labor force. Of course, investment in skills is not randomly distributed, because workers are likely to acquire skills that are in demand in their local labor market. Even so, a random component likely exists, because abilities that influence the skills that workers acquire are, arguably, randomly distributed across the population. A young person with innate mathematical abilities is likely to pursue math-related skills, even if local labor market demand is relatively low. Spatial sorting will occur because of an oversupply of labor market entrants with math-related skills in some areas and an undersupply in others. Therefore, a positive association between the concentration of demand for particular job tasks and the location choice of workers tends to exist. Also, if substantial frictions reduce the flow of workers, wages will tend to be persistently higher where these job tasks are concentrated. These wages will also be positively associated with the location choices of workers.



3 Data development and model specification

The 2001 Canadian Census of Population is used to identify migrants, define their socio-demographic characteristics, and characterize destinations. The first step is to outline the geography used to determine origins, and more importantly, destinations.

The choice set consists of 128 destinations (j= 1 to 128) that cover all of Canada. These include census metropolitan areas (CMAs) and census agglomerations (CAs) with a population of 50,000 or more in 2001. Non-metropolitan areas[7] are measured using the boundaries of economic regions (ERs). These include entire ERs, and because their boundaries overlap with metropolitan areas, the non-metropolitan portion of ERs.[8] While CMAs/CAs and ERs are defined using different criteria, they are relatively coherent economic units—ERs are defined to conduct regional economic analysis; CMAs and CAs, which are determined based on commuting flows, form labor markets. Migrants are defined as employed workers (in 2001) who moved across locations j between 1996 and 2001. People who moved but remained within the same geographic unit are not considered migrants.

To estimate the MNL model, for each migrant, the actual destination and nine randomly selected alternative destinations out of the remaining 127 possibilities are drawn.[9] A random draw is undertaken because of the computational burden of estimating a MNL model with 128 choices. Although the analysis deals with moves outside the migrants' origin, when individuals consider their options, the origin is potentially one of them. Because no information is available about what actually forms their choice set, it is assumed that they choose from the universe including their origin. This approach to restricting the number of alternatives in the choice set yields consistent parameter estimates (McFadden,1978), and has been used in past studies of location choice. For example, in Scott et al.'s (2005) study of the initial location choice of legal employment-based immigrants to the United States, 298 metropolitan areas constituted the choice set universe, from which nine randomly sampled alternative locations were drawn and added to the location that was actually selected.

Excluding people who stay in an origin (stayers) does not change the decision-making process of migrants. The process involves two steps: the first is the decision to move, and the second is the choice of where to move. In this instance, only the choice of where to move is modeled. Thus, the utility maximizing choice across locations is treated as weakly separable from the choice of moving or not moving.

7. Because these non-metropolitan economic regions may include census agglomerations with a population 10,000 to 49,999, a strict application of Statistics Canada's definition would classify some of them as containing metropolitan areas. For this paper, however, all economic regions in the choice set are defined as non-metropolitan.
8. The use of economic regions is a compromise between expanding the choice set to a large number of rural areas, many of which will have few migrants and which would have increased the computational burden of data development, and treating rural areas in each province as geographically and economically incoherent non-metropolitan residuals.
9. Because nine randomly chosen alternatives is arbitrary, the model was also estimated using, on average, five and seven alternatives. The resulting coefficient estimates were qualitatively similar to those for nine random alternatives.

Operationally, the model is specified as follows, where the probability of choosing location j is given by:

$$\text{Prob}(Y_i = j) = \frac{e^{\beta' \ln x_{hj} + \delta' p_h \times \ln x_{hj}}}{\sum_{j=1}^{10} e^{\beta' \ln x_{hj} + \delta' p_h \times \ln x_{hj}}}. \qquad (9)$$

Ideally, (8) would be estimated, but it is difficult to directly measure w_{hj} and q_j. Instead, a set of proxy measures of the expected net present value of income (hereafter termed "expected incomes") and amenities is used in (9), represented by the vector $\mathbf{lnx}_{hj}$. As above, $\mathbf{p}_h$ is a vector of migrants' socio-demographic characteristics, which are included to allow the influence of location characteristics to vary across different classes of migrants. The socio-demographic measures of migrants and proxy measures for income and amenities are summarized in the text box.

Variables characterizing migrants and potential destinations

Migrants

People employed in 2001 who changed residential areas between 1996 and 2001, and were in Canada in both years.

Socio-economic characteristics of migrants

Age 30: Binary variable: 1 = 30 years or less; 0 otherwise.

Self-identified visible minority: Binary variable: 1 = indicate they are a "visible minority" or a "visible minority and white"; 0 otherwise.

French: Binary variable: 1 = French spoken; 0 otherwise.

Degree: Binary variable: 1 = university degree-holder; 0 otherwise.

Characteristics of location *j* in 2001

Employment: Number of people employed in destination.

Shift-share industry effect: Industry structure component of a shift-share-based employment growth decomposition.

Distance of move: Straight-line distance (kilometers) between centroid of origin and centroid of destination.

Income: Average employment income.

Relative industry income: Average employment income of migrant's industry relative to national average employment income of industry.

Relative occupation income: Average employment income of migrant's occupation relative to national average employment income of occupation.

Industry specialization index: Location quotient of migrant's industry.

Occupation specialization index: Location quotient of migrant's occupation.

Unemployment rate: Percentage of labour force that is unemployed.

Climate

- Coastal: Moderate, wet, with relatively warm summers.
- Wet continental: Cold, snowy winters, cool summers.
- Dry continental: Moderate-to-low precipitation with relatively little snow in winter and warm summers.

Visible minority share: Percentage of population who self-identify as visible minorities.

Culture employment share: Percentage of employed who are in culture and heritage occupations.

Local government employment share: Percentage of employment in local, municipal and regional public administration industries (NAICS 913).

Social capital employment share: Percentage of employment in social capital industries—Social Advocacy Organizations (NAICS 81331) and Civic and Social Organizations (NAICS 81341).

Sports employment share: Percentage of employment in spectator sports industries (NAICS 7112).

Restaurant employment share: Percentage of employment in restaurants (NAICS 72211).

Bar employment share: Percentage of employment in bars (NAICS 7224).

French-speaking share: Percentage of persons who speak French in destination *j* in 2001.

Notes: This text box provides a description of the variables that characterize migrants and their potential destinations. 'NAICS' stands for 'North American Industry Classification System.'

Worker *h*'s expectations about future earnings should be positively influenced by the average level of income in *j* (average income), the average income of worker *h*'s industry *I* in location *j*, and the average income of worker *h*'s occupation in location *j*. Interpretation of the effect of average industry and occupation incomes on location choice is complicated by the offsetting effects of amenities and productivity on incomes. High average industry incomes may be due to higher productivity, but they might also be due to poor amenities; the former is expected to have a positive effect on location choice, and the latter, a negative effect. To address this problem,

average industry/occupation incomes in each location *j* are measured as a proportion of their national industry/occupation levels, which, in turn, are divided by the average income of location *j* measured as a proportion of average national incomes. This measure ascertains whether, on average, an industry or occupation in a given location pays more or less than the standard differential for that location. It, therefore, captures the differential in industry/occupation wages that is independent of broader forces driving wages in a location.

For three reasons, the net present value of income is also expected to be positively associated with the extent to which location *j* is specialized in worker *h*'s industry and occupation. First, because there are likely to be more jobs in the worker's industry, the chance of a good match between the worker's skills and firms' requirements is greater, thereby raising worker productivity, and potentially, incomes. Second, pooling of workers in the same industry and occupations tends to result in human-capital spillovers—workers are likely to learn more and increase their human capital and long-run earnings (Glaeser and Maré, 2001). Third, spells of unemployment will likely be shorter if the area has more potential employers. This, too, will tend to increase expected earnings. The specialization in worker *h*'s industry *I* and occupation *o* is measured by using a location quotient based on employment (text box). The unemployment rate in each location is also used as a measure of the risk of being unemployed (text box).

Finally, because of additional moving costs, expected incomes will be lower the greater the distance between origin *i* and destination *j*. Distance may also affect the amount of information available to migrants, and therefore, increase the uncertainty that they associate with moving to a particular location. All else being equal, workers will choose locations where there is less uncertainty about their potential income.

Amenities can be divided into two broad groups of variables: climate and other factors. The climate variables consist of three principal components derived from the amount of annual precipitation, annual snowfall, and mean January and July temperatures. Also included is the difference between January and July temperatures to measure climatic extremes, which are often associated with continental climate conditions. Principal components are used in the model because they help to identify climate archetypes—sets of climate characteristics that tend to be correlated. Three general climate types are identified:

Coastal: moderate, wet, with relatively warm winters. Vancouver and Victoria have high scores as do Halifax and St. John's. Prairie cities like Winnipeg and Saskatoon have very low scores.

Wet continental: cold, snowy winters and cool summers. Fredericton, Quebec City, and Ottawa have high scores; Calgary and Victoria have low scores.

Dry continental: moderate to low precipitation, with relatively little snow in winter and warm summers. Winnipeg and Toronto have relatively high scores.

These climatic types are categories into which specific locations fit to varying degrees. Two locations may have similar scores in one category, but very different scores in another. For instance, Winnipeg and Toronto have high scores for dry continental, but only Winnipeg has a relatively low score for wet continental.

The second set of amenities covers a variety of tangible and intangible features of specific locations. The first is openness or tolerance. Florida (2002a, 2002b) argues that locations more open to differing cultures and lifestyles will be more attractive. Of interest is whether migrants in general, and degree-holders in particular, are attracted to locations known for their "openness." Openness or tolerance is hard to measure directly. The proxy used here is the visible minority share of employment in each location.

The second measure of amenities is the percentage of workers in culture and heritage occupations. The presumption is that a strong culture sector will attract workers who have invested heavily in their human capital (Beckstead et al., 2008).

Also included among amenities are the shares of employment in local government, "social capital industries," sports teams, and restaurants and bars, derived from the Business Register.[10] The share of employment in local government is intended to measure the presence of features such as well-maintained roads and parks. However, this variable may also capture the effect of higher local taxes, which may discourage migration. Hence, its effect on location choice is ambiguous.

Social capital industries are non-profit organizations such as Social and Advocacy Organizations (for example, antipoverty organizations and community action groups) and Civic and Social Organizations (athletic organizations, community associations, and historical clubs). While not a direct measure of social capital, the presence of these organizations suggests a community that is engaged in promoting a strong social fabric.

Finally, the number of sports teams (professional and semi-professional)[11] and the share of employment in restaurants and bars are intended to capture additional consumption amenities.

The hypothesis being tested is that amenities draw migrants. However, a positive economic shock that increases wages might both draw migrants and increase demand for amenities (for example, restaurants and bars). To account for this possibility, the "industry effect" from a shift-share employment growth decomposition is added to the model. The "industry effect" is expected to take into account the effect of exogenous economic shocks (for example, rising employment in the oil and gas sector driven by a positive price shock), be they positive or negative, on each alternative location over the 1996-to-2001-period, and thereby go some distance towards addressing this potential source of bias. It should also be noted that because the study largely covers a period of economic expansion, its results are robust to the effects of economic decline that would raise the importance of income relative to amenities on location choice.

Individual migrants are characterized by their age, self-identified visible minority status, degree-holder status, and language (whether they are French-speaking) (text box). The aim is to determine if degree-holders make different location decisions than do non-degree-holders. Self-identified visible minority status and French speakers are used as controls in the model. Tests of the data were also run on a set of other socio-demographic characteristics (for example, marital status), but these were found to have no qualitative effect on the results.

Descriptive statistics (means, standard deviations, lower and upper quartiles and interquartile range) across alternative locations for most of the variables used in the analysis are presented in Table 1. The average employment in each location was 114,000; the average length of move was 1,688 kilometres; and the average income across locations was $29,000. Factors associated with amenities account for a relatively small share of employment (for example, culture and social capital). Still, variability is considerable, with the standard deviation and interquartile range being about half the value of the mean.

Relative industry/occupation incomes and specialization across locations are difficult to describe, because of the large number of industries and occupations involved.[12] To address this problem, for each industry/occupation measure, their interquartile range across locations is

10. The Business Register provides a more detailed industry breakdown than the Census.
11. Sports teams are measured as a count rather than employment share, because it is expected that the presence of teams rather than their share of metropolitan employment that influences the location choice of migrants (Carlino and Coulson, 2004).
12. Employment and incomes are defined across 285 3-digit industries and 520 occupations.

calculated. These ranges are ranked with descriptive statistics for the lower and upper quartile industries/occupations in Table 1. For relative incomes, there is a fair amount of variability, with an interquartile range for the lower quartile industry being 0.28 on index values of 0.84 and 1.12 for the lower and upper quartile values, respectively. Levels of variability for occupational incomes are similar. The extent of variability for specializations across locations is greater than for incomes, whether specialization is measured in terms of occupational or industry employment (Table 1).

Table 1

Destination characteristics

	Mean	Standard deviation	Lower quartile	Upper quartile	Inter-quartile range
Shift-share industry effect (index)	-0.59	0.53	-0.92	-0.41	0.50
Employment (number)	114,258	275,325	30,650	76,642	45,992
Distance of move (kilometres)	1,688	2,901	520	2,866	2,346
Income (dollars)	29,106	4,171	25,603	31,609	6,006
Relative industry income					
Lower-quartile industry (ratio)	1.00	0.27	0.84	1.12	0.28
Upper-quartile industry (ratio)	1.04	0.36	0.79	1.27	0.48
Relative occupation income					
Lower-quartile occupation (ratio)	1.00	0.30	0.83	1.12	0.28
Upper-quartile occupation (ratio)	1.03	0.44	0.76	1.25	0.49
Industry specialization index					
Lower-quartile industry (index)	0.70	0.43	0.38	0.90	0.52
Upper-quartile industry (index)	0.92	1.10	0.17	1.43	1.26
Occupation specialization index					
Lower-quartile occupation (index)	1.36	0.54	1.00	1.56	0.56
Upper-quartile occupation (index)	1.14	1.32	0.35	1.48	1.12
Unemployment rate (percent)	9.50	5.50	5.60	11.30	5.70
French-speaking share (percent)	21.90	35.40	1.50	22.60	21.10
Self-identified visible minority share (percent)	3.50	5.50	0.70	4.00	3.20
Culture employment share (percent)	1.30	0.60	0.90	1.50	0.70
Local government employment share (percent)	2.60	1.70	1.80	3.10	1.20
Social capital employment share (percent)	0.70	0.60	0.40	0.80	0.40
Sports teams (number)	20.00	55.00	4.00	14.00	10.00
Restaurant employment share (percent)	3.10	1.10	2.40	3.50	1.10
Bar employment share (percent)	0.60	0.40	0.30	0.80	0.50

Notes: For relative industry income and occupation income, the means, standard deviations, and inter-quartile ranges are presented for those ranked according to each in the lower and upper quartiles. The same holds for the industry and occupation specialization indices.

Sources: Statistics Canada, Census of Population (2001) and Business Register (2001).

Two other controls were added to the model. The first is the percentage of the population in each location that speaks French. For English-speaking individuals, a large uniquely French population share may have a negative effect on migration because language barriers may reduce employment opportunities and vice versa. The second control is a set of provincial and metropolitan binary variables[13] intended to capture differences in utility across provinces (for example, due to government policy on public goods or availability of health care) and metropolitan areas, which are not captured by other right-hand-side variables.

13. These include binary variables for all CMAs and CAs with a population of 50,000 or more and binary variables for each province. The excluded category is rural Ontario.

4 Model results

4.1 General model

This paper asks which factors are associated with the location choices of migrants, notably, degree-holders. In particular, compared with people who have not earned a degree, are degree-holders more attracted to thick labor markets and more influenced by amenities? The discussion progresses in two stages. The first presents the basic model, initially including only proxies for expected incomes, and then, a broad set of variables intended to measure variation in amenities across locations. The second tests whether the effects of expected incomes and amenities differ between degree- and non-degree-holders.

Table 2 presents the two base models. The first includes proxies for the expected income of migrants and a set of additional controls. These controls include the French-speaking share of the population of each destination, which is interacted with a binary variable indicating that the migrant speaks French in order to account for the differential effect of this variable on Francophones. Also included, but not reported, are binary variables for the province and metropolitan area of destination to control for unobserved variation in utility across locations. The excluded binary category is rural Ontario.[14]

14. Binary variables were not included for rural and the rural portions of economic regions, because their inclusion prevented the model from converging.

Table 2
Migration location choice models

	Model 1		Model 2	
	coefficient	standard error	coefficient	standard error
Variables				
Shift-share industry effect	9.677 ***	1.929	10.370 ***	1.893
Employment	0.814 ***	0.052	0.946 ***	0.069
Distance of move	-0.939 ***	0.052	-0.950 ***	0.053
Income	1.098 **	0.382	0.583	0.435
Relative industry income	0.105 *	0.047	0.109 *	0.047
Relative occupation income	-0.119 ***	0.035	-0.110 **	0.035
Industry specialization index	0.690 ***	0.015	0.685 ***	0.015
Occupation specialization index	0.575 ***	0.017	0.573 ***	0.017
Unemployment rate	1.862 **	0.620	0.750	0.581
× unemployment rate	-0.378 **	0.140	-0.235 †	0.141
French-speaking share	-0.109 **	0.038	-0.122 **	0.041
× French mother tongue	0.974 ***	0.043	0.967 ***	0.044
Visible minority share	...	...	0.007	0.148
x self-identified visible minority	...	...	0.789 ***	0.041
Culture employment share	...	...	0.057	0.197
Local government employment share	...	...	0.213 †	0.116
Social capital employment share	...	...	0.169 **	0.054
Number of sports teams	...	...	-0.137 *	0.069
Restaurant employment share	...	...	0.165 †	0.096
Bar employment share	...	...	0.040	0.041
Coastal	...	...	-1.193 †	0.669
Wet continental	...	...	-0.900	0.640
Dry continental	...	...	-1.778 ***	0.492

	Model 1	Model 2
Diagnostic statistics		
Number of observations	308,099	308,099
Log likelihood, constant-only model	-360,446	-360,446
Log likelihood	-169,188	-167,516
Chi-square	53,988	73,227
Chi-square p-value	0.000	0.000
Psuedo-R-squared	0.531	0.535

† significant at 0.10 level; * significant at 0.05 level; **significant at 0.01 level; ***significant at 0.001 level.

Notes: Standard errors are heteroscedasticity-consistent and are robust to possible clustering by geographic unit. All models include binary variables for metropolitan areas and provinces.

Sources: Statistics Canada, Census of Population (1996, 2001) and Business Register (2001).

To account for the effect of industry structure on employment growth, Model 1 includes the shift-share industry-effect term from a shift-share decomposition. The coefficient on industry-structure-driven employment growth is positive and significant. Migrants are more likely to choose locations with an industry structure that favored employment growth (Table 2).

Level of employment, which is akin to a mass term in a gravity model, is included to take into account the volume of potential employment opportunities in each location, which are posited to be proportional to the level of employment.[15] The coefficient on the level of employment in each location, regardless of the model, is positive and significant.

Besides the controls, the remaining variables in Model 1 are intended to capture variation in expected incomes across locations. These are the distance between each origin and destination, the overall level of incomes and relative income levels by occupation and industry,

15. There is a high degree of job turnover—voluntary and involuntary—in the economy. It is assumed that the volume of this turnover, in level terms, is greater in larger places, which means more job openings for migrants.

the level of specialization by occupation and industry, and unemployment rates across locations.

As expected, distance has a negative effect on migrants' location choice. This reflects lower expected income, because of the additional cost of moving longer distances. In addition, the farther the destination, the greater the uncertainty about income. The negative association between distance and location choice may also partially reflect the social cost of isolation from family and friends.

In general, migrants are more likely to choose locations where incomes are higher. The average income in each location is positively associated with choosing it, as are relative industry income levels. The parameter estimate on occupation-based incomes, however, is negative and significant. This is unexpected, because, as measured, relative occupational income should not be affected by amenity-driven supply shocks, which would be consistent with a negative parameter estimate. Interestingly, the coefficient on relative occupation income is positive and significant (Beta = 0.26, [robust] standard error = 0.03, p-value = 0.000) when measures of industry and occupational specialization are dropped from the model. This suggests that locations whose occupational income variability is not accounted for by industrial and occupational specialization are less attractive. These may be instances of disequilibrium, where wages are out of line with productivity, leading to less investment and lower employment growth.

Greater specialization in the migrant's industry or occupation means more potential for a match between the migrant's skills and employers' requirements. As expected, the parameters on industry and occupation are positive and highly significant, which is consistent with migrants seeking locations with a close match to their skill set. However, the implications of adding measures of industry and occupational specialization do not end here.

The interpretation of location employment levels is also affected by the inclusion of measures of specialization. Specialization in the migrant's industry/occupation is captured by a location quotient, which is simply the industry's (occupation's) share of employment in a location, normalized by its overall share of employment nationally. So the level of employment in the location enters into the regression equation three times—alone and embedded in the two measures of specialization. Because of this, the independent effect of the level of employment in a location is not the parameter on employment.[16] Instead, it is the value of that parameter subtracted by the parameters on specialization in the industry and occupation of the migrant in the destination.[17] The algebra behind this statement is straightforward. Ignoring the other covariates, $\boldsymbol{\beta}' \ln \mathbf{x}_{ij} = \beta_1 \ln e_j + \beta_2 \ln\left(\frac{e_{ij}}{e_j}\frac{e}{e_i}\right) + \beta_3 \ln\left(\frac{e_{oj}}{e_j}\frac{e}{e_o}\right)$, where e is employment and i, o, and j index industries, occupations and destinations, respectively, and the terms in parentheses are location quotients. Rearranging terms, implies

$\boldsymbol{\beta}' \ln \mathbf{x}_{ij} = (\beta_1 - \beta_2 - \beta_3)\ln e_j + \beta_2 \ln\left(\frac{e_{ij}}{e_i}e\right) + \beta_3 \ln\left(\frac{e_{oj}}{e_o}e\right)$. Hence, the estimated effect of employment in each location is the parameter on employment minus the parameters on the industry and

16. The model was also tested with employment levels in each alternative location less employment in the migrant's industry and occupation to provide a cleaner measure of the association between employment levels and specialization and the location choices of migrants. The results were robust to this change in the employment variable, with essentially no change in the coefficients. As a result, and because of the ease with which coefficients on the unmodified measure of employment can be interpreted, unmodified employment levels are used in the main results.
17. In this formulation, location quotients measure the effect of the national industry (occupation) employment accounted for by location j, after taking into account the size of j. Hence, their interpretation remains intact.

occupation location quotients. When this is calculated, the parameter for employment is negative and significant (Beta = -0.451, chi-square = 65.97, p-value = <0.0001). That is, when employment levels in the migrant's industry and occupation are held constant across locations, larger destinations are less attractive. In other words, large cities are attractive because employment levels in the migrant's industry and occupation are positively related to city size, not because large cities have other appealing attributes (for example, a wider variety of consumption opportunities). In fact, this result suggests that city size is associated with disincentives (for example, pollution and congestion).

Unemployment rates have a statistically significant positive influence on the location choice of migrants. However, they are, at best, weakly significant in the fully specified model (Model 2).

For non-Francophone migrants, the French-speaking share of the population is negatively associated with choosing a location, while for Francophone migrants the association is positive. The negative parameter estimate for non-Francophones is a standard finding in Canadian migration studies and likely reflects concerns about language barriers in and outside the workplace.

Model 2 adds measures of variation in amenities across locations. Amenities can be divided roughly into two groups: climate and other amenities. The first is a set of the three principal components intended to measure differences in climate—coastal, wet continental, and dry continental. The effect of climate on the location choice of migrants varies considerably across these climate zones. The effect of coastal is negative and significant; Vancouver and Victoria score quite highly in this category—metropolitan areas with moderate, but wet, winters. There was no significant negative effect for wet continental, but a negative effect for dry continental (continental climates with cold winters such as Winnipeg, Edmonton, and the Territories).

The second group of variables measures, indirectly, other forms of amenities that might affect migrants' location choice. The visible minority share of the population is a proxy for openness to different lifestyles. The percentages of employment in culture occupations and in restaurant and bar industries and the number of sports teams represent consumption amenities. The share of employment in local government measures the availability of government services, but perhaps also, local taxes. Finally, the presence of non-profit organizations designed to improve social relations and conditions measures social capital.

The association between the share of visible minorities (openness) and the location choice of non-visible minorities is not significant. However, all else being equal, the interaction of the share of visible minorities and migrants who are visible minorities is positive and significant, which is consistent with a tendency to seek locations where others have a similar social and cultural heritage.

The share of employment in local government, social capital, and the share of employment in restaurants and bars are positively and significantly associated with location choice; the number of professional sports teams has a negative and significant association. Associations with shares of employment in culture occupations and in bars are not statistically significant. The positive associations with local government and social capital may indicate that migrants value local government services and a sense of community. The positive parameter on restaurants suggests that their presence is a consumption amenity. However, a larger presence of restaurants and bars may be tied to favorable economic conditions that draw migrants. This confounder is at least partially addressed by the inclusion of a control for employment growth driven by industry structure.

4.2 Degree-holders versus non-degree-holders

A primary goal of this paper is to assess whether workers with substantial investments in human capital behave differently from other workers. Do degree-holders seek labor markets that are likely to increase returns on their investment in specialized skills? Do they place more emphasis on amenities? To answer these questions, degree-holder status is interacted with the explanatory variables in Model 2 (Table 3), first, for the full sample, and then, by age group: 30 or younger and older than 30. Younger workers are of particular interest because they are more likely to move, and, thereby affect the long-run human capital composition of locations.

As noted in Section 2, it is hypothesized that because degree-holders tend to be more specialized, they will have more difficulty matching their skills with employers' requirements. Therefore, it is posited that, compared with non-degree-holders, degree-holders will expand the geographic scope of their search (Schwartz, 1976); that is, degree-holders are more willing to assume the higher search and moving costs of relocating farther away. It is also posited that they tend to seek larger labor markets and labor markets that specialize in their industry and/or occupation.

Table 3

Migration location choice model with university-degree-holder interactions, full sample and by age group

	Full sample		Age group			
			30 or younger		Older than 30	
	coefficient	standard error	coefficient	standard error	coefficient	standard error
Variables						
Shift-share industry effect	11.310 ***	2.209	10.230 ***	2.673	11.920 ***	2.687
× degree	-4.972 *	2.215	-7.399 *	3.498	-3.383	2.704
Employment	0.920 ***	0.072	0.984 ***	0.084	0.886 ***	0.081
× degree	0.122	0.074	0.137	0.117	0.117	0.084
Distance of move	-0.993 ***	0.052	-1.018 ***	0.055	-0.975 ***	0.052
× degree	0.173 ***	0.024	0.178 ***	0.034	0.167 ***	0.030
Income	0.608	0.429	0.608	0.537	0.596	0.523
Relative industry income	0.028	0.046	-0.128 †	0.077	0.128 †	0.066
× degree	0.529 ***	0.116	0.559 **	0.173	0.499 **	0.158
Relative occupation income	-0.124 **	0.042	-0.301 ***	0.066	0.008	0.058
× degree	0.066	0.091	0.179	0.137	0.012	0.134
Industry specialization index	0.660 ***	0.016	0.703 ***	0.022	0.632 ***	0.022
× degree	0.106 **	0.037	0.120 †	0.065	0.102 *	0.051
Occupation specialization index	0.556 ***	0.021	0.620 ***	0.029	0.517 ***	0.027
× degree	0.003	0.050	-0.009	0.073	0.012	0.061
Unemployment rate	0.770	0.582	1.568 *	0.693	0.284	0.672
× unemployment rate	-0.240 †	0.142	-0.441 **	0.170	-0.119	0.159
Coastal	-1.349 *	0.676	-1.409 †	0.729	-1.313 †	0.735
× degree	0.574 ***	0.167	0.377	0.272	0.601 **	0.187
Wet continental	-1.017	0.664	-1.039	0.868	-0.949	0.666
× degree	0.580 †	0.328	1.101 *	0.539	0.372	0.382
Dry continental	-1.742 ***	0.480	-2.192 ***	0.662	-1.446 *	0.579
× degree	-0.222	0.260	-0.489	0.425	0.044	0.404
Culture employment share	0.042	0.194	-0.008	0.215	0.069	0.217
× degree	0.133	0.090	-0.157	0.131	0.317 *	0.144
Local government employment share	0.242 *	0.117	0.125	0.134	0.320 *	0.136
× degree	-0.120 *	0.059	-0.054	0.104	-0.148 *	0.075
Social capital employment share	0.157 **	0.053	0.094	0.071	0.191 ***	0.057
× degree	0.070	0.047	0.113	0.079	0.050	0.052
Number of sports teams	-0.129 †	0.072	-0.212 *	0.092	-0.083	0.078
× degree	-0.028	0.073	0.023	0.108	-0.066	0.081
Restaurant employment share	0.163	0.103	0.270 *	0.124	0.088	0.123
× degree	-0.030	0.070	-0.083	0.099	-0.002	0.092
Bar employment share	0.036	0.042	0.126 *	0.051	-0.023	0.051
× degree	0.008	0.042	0.082	0.068	-0.008	0.049
Visible minority share	0.008	0.148	0.050	0.162	-0.017	0.161
× self-identified visible minority	0.767 ***	0.041	0.788 ***	0.073	0.777 ***	0.049
× degree	0.021	0.043	0.105	0.068	-0.007	0.061
French-speaking share	-0.122 **	0.041	-0.144 **	0.049	-0.109 *	0.044
× French mother tongue	0.970 ***	0.044	0.996 ***	0.059	0.950 ***	0.037

	Full sample	Age group	
		30 or younger	Older than 30
Diagnostic statistics			
Observations	308,099	135,647	172,452
Log likelihood	-166,693	-67,657	-97,922
Chi-square	220,407	102,781	129,326
Chi-square p-value	0.000	0.000	0.000
Psuedo-R-squared	0.54	0.58	0.51

† significant at 0.10 level; * significant at 0.05 level; **significant at 0.01 level; ***significant at 0.001 level.

Notes: Standard errors are heteroscedasticity-consistent and robust to possible clustering by geographic unit. All models include binary variables for metropolitan areas and provinces.

Sources: Statistics Canada, Census of Population (1996, 2001) and Business Register (2001).

The results are broadly consistent with these hypotheses. Degree-holders are less negatively influenced by distance; all else being equal, they are willing to move farther. They are also more likely to move to areas that are specialized in their industry, but not their occupation. The implication is that the benefits that might accrue from better labor matching, shorter spells of unemployment, and potentially stronger accumulation of human capital appear to be industry-specific rather than occupation-specific. When industry and occupation size are taken into account, degree-holders are no more or less likely than non-degree-holders to choose larger areas.

These results suggest that spatial sorting is more important for degree-holders. They are willing to move farther and where they move is biased toward locations that specialize in their industry. In this sense, the benefits of thick labor markets influence the location choices of degree-holders more than those of non-degree-holders. Because degree-holders make up a growing percentage of the workforce (Brown et al., 2010), this suggests an increasingly mobile population of workers that is more likely to settle in large, specialized labor markets.

Degree-holder status was also interacted with the relative incomes of workers in the migrant's industry and occupation.[18] The interaction of degree-holder status and relative industry income was significant, but, for non-degree-holders, the variation in industry income levels was not significantly associated with location choice. This result is consistent with a more inelastic supply of degree-holders than non-degree-holders.

Finally, it was hypothesized that degree-holders would value amenities more than do non-degree-holders, because the higher incomes generated from their greater investment in human capital would reduce the marginal utility of income and raise the relative contribution of amenities. In other words, they should be more willing to trade off income against amenities. In general, this is not the case.

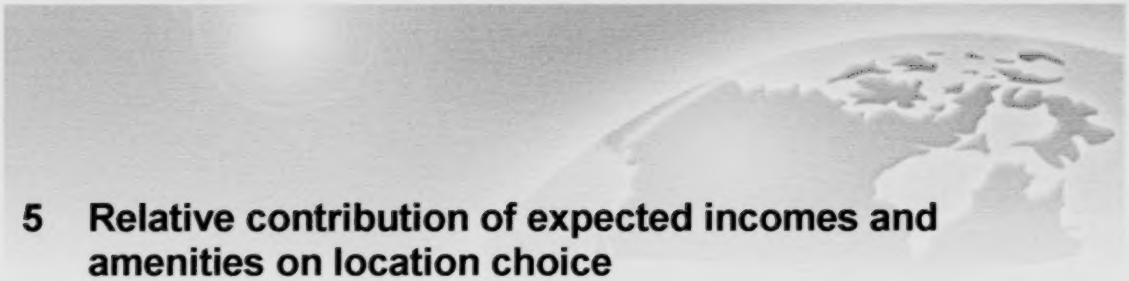
First, the estimated effect of the climate variables on the location choices of degree-holders tends to be weaker. Whether destinations have more or less coastal or wet continental weather conditions is not significantly related to degree-holders' choices. Degree- and non-degree-holders are equally likely not to choose locations characterized by a dry continental climate. So degree-holders, rather than being more sensitive to negative climate types, at least in their extremes, appear to be less sensitive.

The two groups differ with regard to other amenities, but not systematically. For instance, non-degree-holders tend to prefer places with a high share of employment in local government. Degree-holders have no preference for places with more local government, but they do have a greater preference for locales with a stronger presence of social capital industries. Dividing the sample into older and younger migrants does not change these results.

Clear differences emerge between younger and older migrants, but because of the large volume of results, only a few are highlighted here. First, specialization in the migrant's industry and occupation has a stronger effect on the location choice of younger migrants. This is consistent with the presumption that younger workers, who are seeking to match their nascent skills with job tasks and to improve their skills, will be more attracted to larger labor markets. Older, more experienced migrants will not necessarily benefit as much from the matching and human capital accumulation afforded by larger labor markets. As well, they have already developed a reputation and a network of contacts, and they have built up their human capital through experience. This is reinforced by the negative effect of unemployment for younger migrants, but not older ones.

18. Because the interaction term on average income was not statistically significant, it was dropped it from the final specification.

Second, the relationship between amenities and location choices differs between younger and older migrants. Local government and social capital tend to be more important for older migrants, and culture employment is important for older migrants who are degree-holders. Employment share in restaurants and bars is positively associated with the location choice of younger migrants, regardless of degree status, but not for older migrants. These results are consistent with changing preferences over the life cycle, with a night life being more important for younger migrants, while older migrants are more interested in public services and social cohesion.



5 Relative contribution of expected incomes and amenities on location choice

The preceding analysis established that measures of expected incomes and amenities have statistically significant associations with the location choice of migrants. It also demonstrated that, compared with non-degree-holders, degree-holders were more likely to select locations that were specialized in their industry and that were farther away, which is consistent with the hypothesis that the payoff to finding a better match between their skills and job tasks would be greater for migrants with specialized skills.

To estimate the relative contributions of expected incomes and amenities, the proportional change in the odds ratio that would result from an inter-quartile shift—lower quartile to the upper quartile—in the covariates is calculated, for the full sample and across degree- and non-degree-holders (Table 4). For most variables, this calculation is relatively straightforward. However, for industry and occupation incomes and specialization, the inter-quartile shift varies by industry/occupation. Hence, the inter-quartile ranges for lower and upper quartile ranked industries presented in Table 1 are used to assess the impact of variation in specialization and relative incomes on location choices.

Table 4
Change in odds ratio resulting from inter-quartile change in selected covariates

	All	Degree-holders	Non-degree-holders
	odds ratio		
Shift-share industry effect	1.05 †	1.03 †	1.06 †
Employment	2.38 †	2.60 †	2.32 †
Net employment effect	0.75 †	0.77 †	0.76 †
Expected income			
Distance of move	0.20 †	0.25 †	0.18 †
Income	1.13	1.14	1.14
Relative industry income			
Lower-quartile industry	1.03 †	1.18 †	1.01
Upper-quartile industry	1.06 †	1.34 †	1.01
Relative occupation income			
Lower-quartile occupation	0.97 †	0.98	0.96 †
Upper-quartile occupation	0.94 †	0.97	0.94 †
Industry specialization index			
Lower-quartile industry	1.64 †	1.74 †	1.62 †
Upper-quartile industry	3.36 †	3.88 †	3.21 †
Occupation specialization index			
Lower-quartile occupation	1.52 †	1.51 †	1.51 †
Upper-quartile occupation	2.11 †	2.07 †	2.06 †
Amenities			
Coastal	0.80 †	0.87	0.78 †
Wet continental	0.86	0.93	0.84
Dry continental	0.78 †	0.76 †	0.79 †
Visible minority share	1.01	1.05	1.01
Culture employment share	1.03	1.11	1.02
Local government employment share	1.12 †	1.06	1.13 †
Social capital employment share	1.14 †	1.19 †	1.13 †
Number of sports teams	0.84 †	0.82 †	0.85 †
Restaurant employment share	1.06 †	1.05	1.06 †
Bar employment share	1.04	1.04	1.03

† significant at the 0.1 level or less.
Sources: Statistics Canada, Census of Population (1996, 2001) and Business Register (2001).

In the full-model estimates, the effect of expected incomes, and in particular, industry and occupation specialization, tends to be stronger than that of amenities. An inter-quartile shift in the level of industry specialization translates into a 64% and 236% increase in the odds of choosing a location for the lower and upper quartile industries, respectively. The effect of variations in the occupation location quotient is more modest, reflecting a lower coefficient value and less variation in occupational specialization across locations. Still, for a migrant in the lower-quartile occupation, an increase in the location quotient that is equivalent to a shift between the lower and upper quartile would increase the odds of choosing that location by 52%. For the upper-quartile occupation, an increase in the location quotient from the lower to upper quartile would result in a 111% increase in the odds of choosing that location. These are substantial effects that rival the impact of distance on location choice (Table 4). Moreover, the impact of an inter-quartile increase in the level of specialization is much larger than that of any amenity measure. For these, an increase in their value would typically increase (or decrease) the odds of choosing a location by 10% to 20%.

The key question in this paper is whether degree- and non-degree-holders make different decisions about where they choose to live. As has been established, degree-holders are less affected by distance and are more attracted to destinations that have higher wages in their industry and are more specialized in their industry. However, are these statistical differences economically meaningful? The answer is a qualified "yes." For distance, the difference between

the two groups is modest. An inter-quartile increase in distance reduces the odds of choosing a destination by 75% and 82% for degree and non-degree-holders, respectively.

There is a strong effect for relative industry wage differences across locations. For the upper-quartile industry (with respect to relative wage differences across locations), an inter-quartile increase in wages would increase the odds of choosing a location by 34% for degree-holders and an (insignificant) 1% for non-degree-holders. A similar pattern holds for the effect of industry location quotients, where an inter-quartile shift in specialization would result in a 288% increase in the odds that a degree holder would choose that location, compared with a 221% increase for non-degree-holders.

6 Conclusion

The primary objective of this study was to develop a better understanding of factors that influence the location choices of migrants and, in particular, whether migrants who invested heavily in their human capital through education (university degree-holders) behave differently than those who did not (non-degree-holders). Although greater investment in skills brings higher incomes and potentially a more prominent role for amenities in the location choices of migrants, it also increases the challenge of matching specialized skills with employers' needs. So while higher incomes may heighten the relative importance of amenities, specialized skills increase the need to find thick labor markets.

Overall, the findings of the paper suggest that, beyond the standard controls of distance and size, industrial and occupational composition, which are associated with expected incomes, have a profound effect on migrants' location choices. The role of amenities, albeit non-trivial, appears to be secondary. The results also suggest that the differential effect of industrial specialization on degree-holders is not small, particularly for industries that are geographically concentrated.

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